NOVEMBER/DECEMBER 2023

CCA33 — OPERATIONS RESEARCH

Time : Three hours

Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

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1. Define: Basic feasible solution for a LPP.

2. What are the limitations of graphical method.

3. What is meant by balanced transportation problem?

4. Write down the restrictions in assignment problem.

5. Define "ideal time" for a machine 'n' job – 2 machines sequencing problem.

6. Mention the term – no passing.

7. What do you mean by PERT and CPM?

8. Write the expansion of EFT and LST?

9. What is Time Analysis in a network model?

10. Define Minimum spanning tree.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Solve graphically the following linear programming problem.

Max $Z = 2x_1 + 3x_2$

Subject to: $x_1 - x_2 \leq 2$

$x_1 + x_2 \geq 4$ and $x_1, x_2 \geq 0$

Or

(b) A Person requires 10, 12 and 12 units of A, B,C respectively for his garden. A liquid product contains 5,2 and 1 units of A, B and C per carton. If the liquid product sells for Rs. 3 per jar and the dry product sells for Rs. 2 per carton, how many of each should he purchase in order to minimize the cost and meet the requirement?

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12. (a) State the difference between transportation problem and assignment problem.

Or

18. Determine an optimal sequence and total elapsed time of the following sequencing problem.

	M_1	M_2	M_3	M_4	M_5	M_6
Job A:	18	8	7	2	10	25
Job B:	17	6	9	6	8	19
Job C:	11	5	8	5	7	15
Job D:	20	4	3	4	8	12

19. For a small project of 2 activities, the details are given below, Draw the network and compute earliest occurrence time, latest occurrence time, critical activities and project completion time.

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Dependence	-	-	-	BC	A	C	E	E	DFH	E	IJ	G
Duration (days)	9	4	7	8	7	5	10	8	6	9	10	2

20. Explain linear programming of Formulation of Maximal flow mode.

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(b) Four different jobs can be done on four different machines and take downtie costs are prohibitively high for change overs. The matrix below gives the cost in rupees of producing job I on machine j:

	Machine			
Jobs	M_1	M_2	M_3	M_4
J_1	5	7	11	6
J_2	8	5	9	6
J_3	4	7	10	7
J_4	10	4	8	3

How the jobs should be assigned to the various machine so that the total cost is minimized.

13. (a) List the basic assumptions under lying a sequence problem.

Or

(b) There are five jobs, each of which is to be processed through two machines M_1, M_2 in the order M_1, M_2. Processing hours are as follows:

Job	1	2	3	4	5
M_1	3	8	5	7	4
M_2	4	10	6	5	8

Determine the optimal sequence of jobs and total elapsed time. Also, find the idle time for two machines.

14. (a) Write down the procedure to find PERT calculation in a network.

Or

(b) What are different types of floats associated with an activity in a CPM model? What are their uses?

15. (a) Explain in detail about various phases of project management.

Or

(b) Write short notes on Prim's Algorithm in solving in minimum spanning tree with an example.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Use Simplex method to solve the following LPP.

Max $Z = x_1 - x_2 + 3x_3$

Subject to

$x_1 + x_2 + x_3 \le 102x_1 - x_3 \le 2$

$2x_1 - 2x_2 + 3x_3 \le 0$

$x_{1,2},, K_3, \ge 0.$

17. Use Vogel's Approximation method to obtain an initial basic feasible solution of the transportation Problem.

	D	E	F	G	Available
A	11	13	17	14	250
B	[16	18	14	10]	300
C	21	24	13	10	400
Demand	200	225	275	250	